Here are detailed coaching-level notes for your updated Day 1 plan focusing on Class 12 priority chapters with clear concepts, formulas, and practice examples.

Physics: Electrostatics – Basic Concepts (40 min)

1. Electric Charge

- Fundamental property of matter responsible for electric phenomena.
- Two types: Positive (+) and Negative (−) charges.
- **Properties:**
    - Charge is quantized: smallest charge = electron charge $e = 1.6 \times 10^{-19} C$.
    - Charges are conserved.
    - Like charges repel; unlike charges attract.
    - Charge is scalar but obeys vector addition in forces.

2. Conductors vs Insulators

- **Conductors:** Materials allowing free movement of charges (e.g. metals).
- **Insulators:** Materials where charges do not move freely (e.g. rubber, glass).
- Electric field inside conductor is zero in electrostatic equilibrium.
- Charges reside on the surface of conductors.

3. Coulomb's Law

- **Statement:** The force between two point charges $q_1$and $q_2$is directly proportional to the product of charges and inversely proportional to the square of the distance $r$between them.
- **Formula:**

$$F = k\frac{|\ q_1 q_2\ |}{r^2}$$

where $$
k = \frac{1}{4 \pi \epsilon_0} \approx 9 \times 10^9 , Nm^2/C^2

- Force acts along the line joining two charges.
- Vector quantity: Consider direction (attraction/repulsion).

4. Superposition Principle

- Total force on a charge due to multiple charges is the vector sum of individual forces.
- Example: For charges $q_1, q_2, \ldots, q_n$acting on q_0,

$$\vec{F} = \sum_{i=1}^{n} \vec{F_i}$$

5. Electric Field (Basic Definition)

- Electric field $\vec{E}$ at a point is the force experienced by a unit positive charge placed there.
- Formula:

$$\vec{E} = \frac{\vec{F}}{q}$$

- For point charge Q:

$$\vec{E} = k\frac{Q}{r^2}\hat{r}$$

- Vector field pointing away from positive and toward negative charges.

Chemistry: Solid State – Introduction (40 min)

1. Types of Solids

- Solid structures classified mainly by bonding:
  - **Ionic solids:** Made of positive and negative ions (e.g., NaCl) – high melting points, brittle.
  - **Covalent solids:** Atoms bonded by covalent bonds (e.g., diamond) – very hard, high melting points.
  - **Metallic solids:** Metal atoms with sea of electrons (e.g., Cu) – malleable, good conductors.
  - **Molecular solids:** Molecules held by weak forces (e.g., ice) – low melting points.

2. Crystal Lattice

- 3D array of points representing arrangement of particles in a crystal.
- Each lattice point may represent an atom, ion, or molecule.

3. Unit Cell (Basic Idea)

- Smallest repeating unit in the crystal lattice that shows the full symmetry of the crystal.
- Parameters: edge lengths (a, b, c) and angles (α, β, γ).

4. Primitive vs Centered Unit Cells

- **Primitive Unit Cell:** Contains lattice points only at corners.

- **Centered Unit Cell:** Has additional lattice points centered on faces (face-centered) or inside body (body-centered).
- Example:
    - Simple cubic: primitive.
    - Body-centered cubic (BCC).
    - Face-centered cubic (FCC).

Maths: Relations & Functions – Part 1 (40 min)

1. Definition of a Relation

- Relation $R$from set $A$to set $B$is a subset of Cartesian product $A \times B$, i.e.,

$$R \subseteq A \times B$$

- Ordered pairs $(a, b) \in R$imply $a$is related to b.

2. Domain and Range

- **Domain:** Set of all $a \in A$such that there exists some $b \in B$with $(a, b) \in R$.
- **Range:** Set of all $b \in B$for which there exists $a \in A$with $(a, b) \in R$.

3. Types of Relations (Basic Intro)

- **Reflexive:** Every element related to itself, $(a, a) \in R \forall a \in A$.
- **Symmetric:** If $(a, b) \in R$, then $(b, a) \in R$.
- **Transitive:** If $(a, b) \in R$and $(b, c) \in R$, then $(a, c) \in R$.

4. Ordered Pairs

- Elements of $A \times B$are of form (a, b).
- Checking if $(a, b) \in R$defines the relation.

5. Example Problems (from NCERT Exercises 1.1 and 1.2)

- If $A = \{1,2\}$, $B = \{3,4\}$, list all relations from $A$to B.
- Determine domain and range for relations given.
- Classify relations as reflexive, symmetric, or transitive based on sets and pairs.

If you need, practice problems and deeper explanation on any specific subtopic can be provided.