

# CAMBRIAN PUBLIC SCHOOL

Kanke Road, Ranchi (Jharkhand-834008) Affi-3430087, School code- 66276

## Class 12 Physics

### Summer Vacation Homework

#### Topic: Electrostatics | Chapters 1 & 2 NCERT

##### A. Concept-Based Questions

Attempt in your notebook.

1. Explain why electric field lines never cross each other. Give one daily life analogy.
2. Define electric dipole moment. What is its direction and SI unit?
3. State Gauss's Law. Use it to find electric field due to an infinitely long charged wire.
4. Why is the electrostatic potential inside a charged conductor zero? What about electric field?
5. Explain the principle of a capacitor. How does inserting a dielectric slab increase capacitance?

##### B. Numerical Problems

Solve neatly with proper steps. Refer NCERT Examples + Exercises.

1. Two point charges  $+10 \mu\text{C}$  and  $-10 \mu\text{C}$  are placed 5 mm apart. Calculate dipole moment. If placed in uniform  $E = 10^4 \text{ N/C}$ , find torque when dipole makes  $30^\circ$  with field.
2. A parallel plate capacitor has plate area  $25 \text{ cm}^2$  and separation 2 mm. Find capacitance. If connected to 100 V battery, find charge and energy stored. What happens if distance is doubled?
3. Three charges  $1 \mu\text{C}$ ,  $2 \mu\text{C}$ ,  $-3 \mu\text{C}$  are placed at vertices of equilateral triangle of side 1 m. Find potential energy of system.
4. Using Gauss's Law, derive E at a point outside a uniformly charged spherical shell of radius R. Plot E vs r graph.

5. NCERT Exercise: Ch 1 - Q 1.12, 1.15, 1.23 | Ch 2 - Q 2.5, 2.10, 2.15

### C. Derivation Practice

Write on A4 sheets. These are 3-mark & 5-mark board questions.

1. Electric field due to electric dipole at axial and equatorial point.
2. Capacitance of parallel plate capacitor with and without dielectric.
3. Derive Energy stored in a capacitor.

### D. Creative/Activity Work

Choose any ONE:

1. **\*Chart\***: Make a comparison chart of Electric Field vs Gravitational Field with formulas, nature, and examples.
2. **\*Investigation\***: Research and write 1 page on “Electrostatics in Daily Life” - examples like photocopiers, paint spraying, lightning rods. Add pictures.

### \*E. MCQ Practice for NEET/JEE\*

Solve 20 MCQs from any reference book/online. Write question + correct option + 1-line reason. Topics: Coulomb’s law, E, V, Dipole, Gauss Law, Capacitors.

### \*Instructions:\*

1. Do all written work in a separate “Physics Holiday Homework” notebook.
2. Submit first day after vacation. Viva may be taken.
3. Revise NCERT + derivations. This portion has ~16 marks weightage in CBSE.