

QUICK DRILL · CBSE CLASS 12

Electric Charges and Fields

Physics · Chapter 1 · 15 MCQs · 20 minutes · PYQ-tagged with time budgets

DATE	TOTAL MARKS	DURATION	MARKING	TARGET
_____	15	20 min	+1/0	≥ 12/15

OBJECTIVES

Reinforce the four core topics of Electric Charges and Fields via 15 PYQ-derived MCQs. Identify weak sub-topics via concept-node IDs (see answer key). Build per-question time budget habit.

INSTRUCTIONS

Attempt all 15. Time budget shown per Q (use it as pacing guide). Mark answers (A/B/C/D) in the margin. Answer key + explanations on the last page. **Don't peek — score yourself honestly.**

SECTION · QUICK DRILL

Q 1-15 · 20 MIN

Q1. The SI unit of electric charge is:

- (A) Newton (B) Coulomb
(C) Volt (D) Joule

PYQ 2018 · Outside Delhi · 1m · ⌚ 20s

Q2. Charge is quantised means:

- (A) It cannot be measured (B) Always positive
(C) Exists only in discrete multiples of e (D) Conserved

PYQ 2019 · Delhi · 1m · ⌚ 25s

Q3. The force between two point charges placed in a medium of dielectric constant K, compared to vacuum:

- (A) K times stronger (B) K times weaker
(C) Same (D) K² times weaker

PYQ 2022 · All India · 1m · ⌚ 30s

Q4. The electric field at the centre of a uniformly charged ring of radius R:

- (A) kQ/R^2 (B) $kQ/(2R^2)$
(C) Infinity (D) Zero

PYQ 2020 · Delhi · 1m · ⌚ 45s

Q5. Electric field lines never cross because:

- (A) It's an artistic rule (B) Two directions of E at a point would contradict
(C) They are infinite (D) They start from positive only

PYQ 2017 · Outside Delhi · 1m · ⌚ 30s

Q6. The electric dipole moment p of a dipole with +q and -q separated by 2a is:

- (A) q·a, from -q to +q (B) q·(2a), from -q to +q
(C) 2q·a, from +q to -q (D) q/(2a)

PYQ 2018 · All India · 1m · ⌚ 30s

Q7. The electric field on the axial line of a short dipole at distance r from centre ($r \gg a$):

- (A) kp/r^2 (B) $2kp/r^3$
(C) kp/r^3 (D) $2kp/r^2$

PYQ 2019 · Delhi · 1m · ⌚ 40s

Q8. For a point on the equatorial line of a short dipole, E direction is:

- (A) Along \vec{p} (B) Opposite to \vec{p}
(C) Perpendicular to \vec{p} (D) Zero

PYQ 2022 · Outside Delhi · 1m · ⌚ 30s

Q9. Torque on an electric dipole in uniform field E at angle θ :

- (A) pE cos θ (B) pE sin θ
(C) pE (D) pE tan θ

PYQ 2023 · Delhi · 1m · ⌚ 30s

Q10. SI unit of electric flux is:

- (A) N/C (B) C/m²
(C) N·m²/C (D) V/m²

PYQ 2018 · All India · 1m · ⌚ 25s

Q11. Gauss's law states:

(A) $\oint \mathbf{E} \cdot d\mathbf{A} = q/\epsilon_0$ (closed surface)

(C) $E = kq/r^2$

PYQ 2019 · All India · 1m · ⌚ 25s

(B) $\oint \mathbf{E} \cdot d\mathbf{A} = q\epsilon_0$

(D) $F = kq_1q_2/r^2$

Q12. E due to an infinite line of charge (λ) at perpendicular distance r:

(A) $\lambda/(2\pi\epsilon_0 r)$

(C) $\lambda/(2\pi\epsilon_0 r^2)$

PYQ 2020 · Delhi · 1m · ⌚ 40s

(B) $\lambda/(4\pi\epsilon_0 r^2)$

(D) $\lambda/(4\pi\epsilon_0 r)$

Q13. E due to an infinite plane sheet of charge (σ):

(A) σ/ϵ_0

(C) $\sigma/(4\epsilon_0)$

PYQ 2022 · All India · 1m · ⌚ 40s

(B) $\sigma/(2\epsilon_0)$

(D) $\sigma\epsilon_0$

Q14. Electric field inside a uniformly charged thin spherical shell:

(A) kQ/R^2

(C) Zero

PYQ 2023 · All India · 1m · ⌚ 35s

(B) kQ/r^2

(D) Infinite

Q15. Two equal positive charges +q are placed at corners of an equilateral triangle of side a. The force on the third charge +q at the third vertex is:

(A) kq^2/a^2

(C) $2kq^2/a^2$

PYQ 2019 · Outside Delhi · 1m · ⌚ 75s

(B) $\sqrt{3} \cdot kq^2/a^2$

(D) $kq^2/(a^2\sqrt{2})$

ANSWER KEY & EXPLANATIONS

Q 1-15 · MARK YOUR SCORE

Q1. Answer: B

Coulomb (C) is the SI unit of charge. $1\text{ C} \approx 6.24 \times 10^{18}$ electrons.

Q2. Answer: C

$q = n \cdot e$ where n is an integer. No fractional charges in isolation.

Q3. Answer: B

$F_{\text{medium}} = F_{\text{vacuum}} / K$. Dielectric reduces the force.

Q4. Answer: D

By symmetry, contributions from opposite arc elements cancel. $E = 0$ at centre.

Q5. Answer: B

Tangent at a point gives E direction; one point can have only one direction.

Q6. Answer: B

$p = q \times (\text{separation})$; direction from -q to +q by convention.

Q7. Answer: B

$E_{\text{axial}} = (1/4\pi\epsilon_0) \cdot (2p/r^3)$, along p^{\rightarrow} . Twice the equatorial magnitude.

Q8. Answer: B

$E_{\text{equatorial}}$ is anti-parallel to p^{\rightarrow} (NCERT convention).

Q9. Answer: B

$\tau = p \times E$; magnitude $pE \sin \theta$. Maximum when $p \perp E$.

Q10. Answer: C

$\Phi = \oint \mathbf{E} \cdot d\mathbf{A}$. Units = $(\text{N/C})(\text{m}^2) = \text{N} \cdot \text{m}^2/\text{C}$. Same as $\text{V} \cdot \text{m}$.

Q11. Answer: A

Total flux through closed surface = enclosed charge / ϵ_0 .

Q12. Answer: A

$E = \lambda/(2\pi\epsilon_0 r)$, radial. $1/r$ falloff (not $1/r^2$).

Q13. Answer: B

$E = \sigma/(2\epsilon_0)$, uniform on both sides. Doesn't depend on distance.

Q14. Answer: C

By Gauss's law: no enclosed charge inside $\Rightarrow E = 0$ throughout interior.

Q15. Answer: B

Two forces of kq^2/a^2 at 60° . Resultant = $\sqrt{3} \cdot kq^2/a^2$, along the bisector.