QUICK DRILL · CBSE CLASS 12

Moving Charges and Magnetism

Physics · Chapter 4 · 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 Moving Charges and Magnetism 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 work done by a magnetic force on a charged particle moving in a magnetic field is:

(A) Always positive
(B) Always negative
(C) Always zero
(D) Equal to the change in kinetic energy

PYQ 2019 · Delhi · 1m · ? 30s

Q2. A charged particle moves in a circle of radius r in a uniform magnetic field B. If its speed doubles (B unchanged), the radius becomes:

(A) r/2
(B) r
(C) 2r
(D) 4r

PYQ 2020 · Outside Delhi · 1m · ? 30s

Q3. The cyclotron frequency of a charged particle is independent of its:

(A) Charge
(B) Mass
(C) Speed
(D) Magnetic field

PYQ 2018 · Delhi · 1m · ? 30s

Q4. The magnetic field at the centre of a circular loop of radius R carrying current I is:

(A) mu_0 I/(4*pi*R)
(B) mu_0 I/(2R)
(C) mu_0 I/R
(D) 2 mu_0 I/R

PYQ 2021 · Delhi · 1m · ? 30s

Q5. Two long parallel wires carry currents in the same direction. They:

(A) Attract each other
(B) Repel each other
(C) Exert no force
(D) Rotate about each other

PYQ 2019 · Outside Delhi · 1m · ? 30s

Q6. The magnetic field deep inside a long solenoid of n turns per metre carrying current I is:

(A) mu_0 I/(2*pi*n)
(B) mu_0 n I
(C) mu_0 I/n
(D) mu_0 n/I

PYQ 2022 · Delhi · 1m · ? 30s

Q7. To convert a galvanometer into an ammeter, a resistance is connected:

(A) Of high value in series
(B) Of low value in parallel
(C) Of high value in parallel
(D) Of low value in series

PYQ 2023 · Delhi · 1m · ? 30s

Q8. The magnetic moment of a circular coil of N turns, area A, carrying current I is:

(A) I A / N
(B) N I A
(C) N I / A
(D) N A / I

PYQ 2020 · Delhi · 1m · ? 30s

Q9. In a velocity selector, particles pass undeflected when their speed equals:

(A) B/E
(B) E/B
(C) EB
(D) E^2/B

PYQ 2021 · Outside Delhi · 1m · ? 30s

Q10. The force on a straight conductor of length L carrying current I in a uniform field B (angle theta between them) is:

(A) BIL cos(theta)
(B) BIL sin(theta)
(C) BIL tan(theta)
(D) BIL

PYQ 2018 · Outside Delhi · 1m · ? 30s

Q11. Ampere's circuital law relates the closed line integral of B to the:

(A) Total charge enclosed
(B) Net current enclosed
(C) Magnetic flux enclosed
(D) Area of the loop

PYQ 2023 · Delhi · 1m · 30s

Q12. A proton and an alpha particle enter the same uniform field with the same speed perpendicular to B. The ratio of their radii r_p : r_alpha is (alpha: mass 4m, charge 2e):

(A) 1 : 1
(B) 1 : 2
(C) 2 : 1
(D) 1 : 4

PYQ 2024 · Delhi · 1m · 45s

Q13. The torque on a current loop in a uniform magnetic field is zero when the plane of the loop is:

(A) Parallel to B
(B) Perpendicular to B
(C) At 45 deg to B
(D) At 60 deg to B

PYQ 2022 · Outside Delhi · 1m · 45s

Q14. The field at the centre of a coil with N turns of radius R carrying current I is:

(A) mu_0 I/(2R)
(B) mu_0 N I/(2R)
(C) mu_0 I/(2NR)
(D) mu_0 N I/R

PYQ 2019 · Delhi · 1m · 30s

Q15. One ampere is defined as the current that produces a force per unit length between two parallel wires 1 m apart in vacuum of:

(A) 2 x 10^-7 N/m
(B) 1 x 10^-7 N/m
(C) 4*pi x 10^-7 N/m
(D) 2 x 10^-5 N/m

PYQ 2024 · Outside Delhi · 1m · 30s

ANSWER KEY & EXPLANATIONS

Q 1–15 · MARK YOUR SCORE

Q1. Answer: C

F = qv x B is perpendicular to v, so F.v = 0. A magnetic force does zero work and cannot change kinetic energy.

Q2. Answer: C

r = mv/(qB) is proportional to v. Doubling v doubles r to 2r.

Q3. Answer: C

f = qB/(2*pi*m) depends on q, B and m but NOT on the speed (or radius) of the particle.

Q4. Answer: B

Putting x = 0 in the axial result gives B = mu_0 I/(2R) at the centre of the loop.

Q5. Answer: A

Like (same-direction) currents attract; opposite-direction currents repel. F/L = mu_0 I1 I2/(2*pi*d).

Q6. Answer: B

By Ampere's law, B = mu_0 n I inside a long solenoid; it is uniform and directed along the axis.

Q7. Answer: B

An ammeter needs low resistance, so a small shunt is connected in PARALLEL: S = I_g G/(I - I_g).

Q8. Answer: B

Magnetic moment m = N I A. It depends on turns, current and area enclosed, not on the shape of the boundary.

Q9. Answer: B

Electric and magnetic forces balance: qE = qvB, so v = E/B. Only this speed passes straight through.

Q10. Answer: B

F = I L x B, so the magnitude is BIL sin(theta). It is maximum when the conductor is perpendicular to B.

Q11. Answer: B

Closed integral of B.dL = mu_0 I_enc — the line integral equals mu_0 times the net current threading the loop.

Q12. Answer: B

r = mv/(qB). r_p/r_alpha = (m/e)/(4m/2e) = (m/e)/(2m/e) = 1/2, so 1 : 2.

Q13. Answer: B

tau = NIAB sin(theta) where theta is between m (normal to loop) and B. When the loop's PLANE is perpendicular to B, m is parallel to B, theta = 0, sin(theta) = 0 => tau = 0.

Q14. Answer: B

Each turn contributes mu_0 I/(2R); N turns give B = mu_0 N I/(2R) at the centre.

Q15. Answer: A

F/L = mu_0 I1 I2/(2*pi*d). With I1 = I2 = 1 A and d = 1 m, F/L = (4*pi x 10^-7)(1)(1)/(2*pi) = 2 x 10^-7 N/m.