

QUICK DRILL · CBSE CLASS 11

Motion in a Plane

Physics · Chapter 3 · 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 Motion in a Plane 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. Which of the following is a vector quantity?

(A) Mass

(C) Acceleration

PYQ 2018 · Delhi · 1 m · 20s

(B) Time

(D) Volume

Q2. A vector A of magnitude 10 makes an angle of 60 degrees with the +x axis. Its x-component is:

(A) 5

(C) 10

PYQ 2019 · Delhi · 1 m · 30s

(B) 8.66

(D) 0

Q3. Two vectors of magnitudes 3 and 4 are perpendicular. The magnitude of their resultant is:

(A) 1

(C) 7

PYQ 2020 · Delhi · 1 m · 30s

(B) 5

(D) 12

Q4. A projectile is launched from the ground at angle 30 degrees with $u = 20$ m/s. Time of flight ($g = 10$ m/s²) is:

(A) 1 s

(C) 3 s

PYQ 2021 · Delhi · 1 m · 45s

(B) 2 s

(D) 4 s

Q5. Horizontal range of a projectile launched from ground is maximum at angle:

(A) 30 degrees

(C) 60 degrees

PYQ 2018 · Outside Delhi · 1 m · 30s

(B) 45 degrees

(D) 90 degrees

Q6. At the highest point of a projectile motion, the velocity is:

(A) Zero

(C) $u \cos \theta$ (horizontal)

PYQ 2022 · Delhi · 1 m · 30s

(B) $u \sin \theta$

(D) $u \tan \theta$

Q7. A stone whirled in a horizontal circle of radius 0.5 m at 4 m/s has centripetal acceleration:

(A) 8 m/s²

(C) 32 m/s²

PYQ 2023 · Outside Delhi · 1 m · 30s

(B) 16 m/s²

(D) 64 m/s²

Q8. The dot product of two perpendicular vectors A and B is:

(A) AB

(C) $AB / 2$

PYQ 2020 · Outside Delhi · 1 m · 20s

(B) Zero

(D) -AB

Q9. A stone is thrown horizontally with 10 m/s from a 20 m cliff ($g = 10$). Time to reach ground:

(A) 1 s

(C) 3 s

PYQ 2019 · Outside Delhi · 1 m · 45s

(B) 2 s

(D) 4 s

Q10. Two forces of 5 N and 5 N act at an angle of 60 degrees. Their resultant magnitude is:

(A) 5 N

(C) 10 N

PYQ 2021 · Outside Delhi · 1 m · 45s

(B) $5\sqrt{3}$ N

(D) $5\sqrt{2}$ N

Q11. If $A = 3\hat{i} + 4\hat{j}$, magnitude of A is:

(A) 3

(C) 5

PYQ 2022 · Outside Delhi · 1m · 20s

(B) 4

(D) 7

Q12. Maximum height of a projectile launched at 45 degrees with $u = 20$ m/s ($g = 10$):

(A) 5 m

(C) 20 m

PYQ 2020 · Delhi · 1m · 45s

(B) 10 m

(D) 40 m

Q13. Cross product of two parallel vectors is:

(A) Zero

(C) AB

PYQ 2023 · Delhi · 1m · 20s

(B) Maximum

(D) $AB/2$

Q14. A body in uniform circular motion has:

(A) Constant velocity

(C) Zero acceleration

PYQ 2024 · Delhi · 1m · 30s

(B) Constant speed but changing velocity

(D) Constant acceleration vector

Q15. Range of a projectile is the same for which pair of angles (ground-to-ground)?

(A) 20 and 60 degrees

(C) 45 and 90 degrees

PYQ 2018 · Delhi · 1m · 45s

(B) 30 and 60 degrees

(D) 10 and 70 degrees

ANSWER KEY & EXPLANATIONS

Q 1-15 · MARK YOUR SCORE

Q1. Answer: C

Acceleration has both magnitude and direction. Mass, time, and volume are scalars.

Q2. Answer: A

$A_x = A \cos \theta = 10 \cos 60 = 10 \cdot 0.5 = 5$.

Q3. Answer: B

Perpendicular case: $R = \sqrt{A^2 + B^2} = \sqrt{9 + 16} = \sqrt{25} = 5$.

Q4. Answer: B

$T = 2u \sin \theta / g = 2 \cdot 20 \cdot \sin 30 / 10 = 2 \cdot 20 \cdot 0.5 / 10 = 2$ s.

Q5. Answer: B

$R = u^2 \sin(2\theta) / g$ is max when $\sin(2\theta) = 1$, i.e. $2\theta = 90 \Rightarrow \theta = 45$ degrees.

Q6. Answer: C

Vertical component v_y is zero at peak; horizontal component $v_x = u \cos \theta$ remains unchanged.

Q7. Answer: C

$a_c = v^2 / r = 16 / 0.5 = 32$ m/s².

Q8. Answer: B

$A \cdot B = AB \cos \theta$. For $\theta = 90$, $\cos 90 = 0 \Rightarrow A \cdot B = 0$.

Q9. Answer: B

$H = (1/2) g t^2 \Rightarrow 20 = (1/2)(10) t^2 \Rightarrow t^2 = 4 \Rightarrow t = 2$ s. Horizontal motion does not affect time.

Q10. Answer: B

$R = \sqrt{25 + 25 + 2 \cdot 5 \cdot 5 \cdot \cos 60} = \sqrt{25 + 25 + 25} = \sqrt{75} = 5\sqrt{3}$ N.

Q11. Answer: C

$|A| = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$.

Q12. Answer: B

$H = u^2 \sin^2 \theta / (2g) = 400 \cdot (1/2) / 20 = 200/20 = 10$ m.

Q13. Answer: A

$A \times B = AB \sin \theta \hat{n}$. For $\theta = 0$ (parallel), $\sin 0 = 0 \Rightarrow$ cross product is zero.

Q14. Answer: B

Speed is constant but direction of velocity changes continuously, so velocity vector is not constant; centripetal acceleration is non-zero and continuously changes direction too.

Q15. Answer: B

Range $R = \frac{u^2 \sin(2\theta)}{g}$. $\sin(2\theta)$ is same for θ and $(90 - \theta)$. $30 + 60 = 90$, so they give same range.