

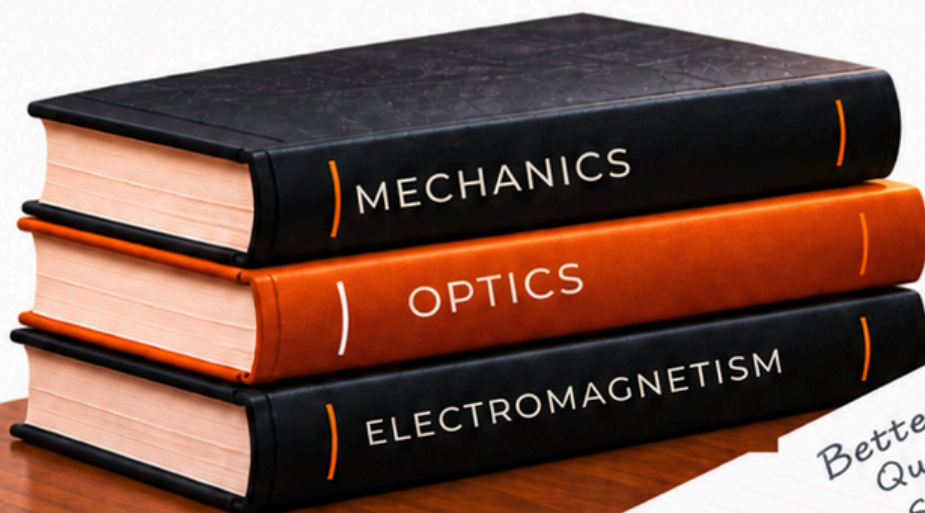
JEE Main Physics

Motion in a straight line: speed and velocity PYQ

$$F = ma$$



$$v = u + at$$



Subject: Physics

Years: 2025-2021

Total Questions: 15

About this PYQ collection

What is inside

A complete topic-wise set of **15 previous year questions** on **Motion in a straight line: speed and velocity** from **JEE Main (2025-2021)**, across **5 exam years**. **15 questions** are from 2019 onwards, so most of the set reflects the recent NTA pattern.

Questions are arranged to reduce unused page space, with newest-first priority and continuous numbering from 1. Each carries an exam date and shift tag to trace the original paper.

Topic-wise questions

TOPIC	QS	%
Motion in a straight line: speed and velocity	15	100%

Question types

TYPE	QS	%
Single-correct MCQ	12	80%
Numerical value	3	20%

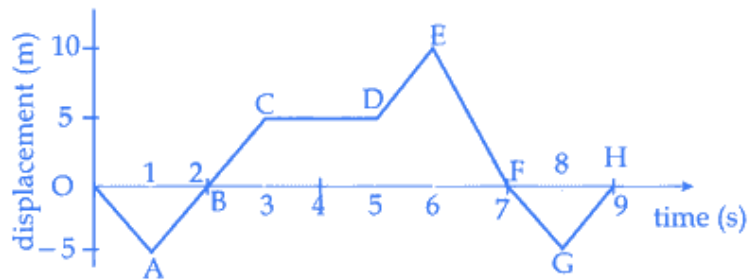
Numerical-value questions have no options; all 3 are from 2022 onwards.

How these questions help you

- **Know where the marks are:** motion in a straight line: speed and velocity make up **15 of 15 questions (about 100%)**.
- **Build speed and accuracy:** practice the concepts and question styles used in previous papers.
- **Learn the patterns:** the same question styles return year after year.
- **Strengthen other chapters:** these concepts support further study in Physics.

Questions – Motion in a straight line: speed and velocity

1. The displacement x versus time graph is shown below.



- (A) The average velocity during 0 to 3 s is 10 m/s
 (B) The average velocity during 3 to 5 s is 0 m/s
 (C) The instantaneous velocity at $t = 2$ s is 5 m/s
 (D) The average velocity during 5 to 7 s and instantaneous velocity at $t = 6.5$ s are equal
 (E) The average velocity from $t = 0$ to $t = 9$ s is zero

Choose the correct answer from the options given below :

(4 Apr 2025 | Shift 2)

- | | |
|------------------------|------------------------|
| (A) (B), (C), (D) only | (B) (B), (D), (E) only |
| (C) (A), (D), (E) only | (D) (B), (C), (E) only |

2. A person travelling on a straight line moves with a uniform velocity v_1 for a distance x and with a uniform velocity v_2 for the next $\frac{3}{2}x$ distance. The average velocity in this motion is $\frac{50}{7}$ m/s. If v_1 is 5 m/s then $v_2 = \underline{\hspace{2cm}}$ m/s.

(2 Apr 2025 | Shift 1)

3. A particle moving in a straight line covers half the distance with speed 6 m/s. The other half is covered in two equal time intervals with speeds 9 m/s and 15 m/s respectively. The average speed of the particle during the motion is :

(9 Apr 2024 | Shift 1)

- | | |
|-------------|-------------|
| (A) 9.2 m/s | (B) 8.8 m/s |
| (C) 10 m/s | (D) 8 m/s |

4. A train starting from rest first accelerates uniformly up to a speed of 80 km/h for time t , then it moves with a constant speed for time $3t$. The average speed of the train for this duration of journey will be (in km/h) :

(6 Apr 2024 | Shift 1)

- | | |
|--------|--------|
| (A) 70 | (B) 40 |
| (C) 30 | (D) 80 |

5. The position of a particle related to time is given by $x = (5t^2 - 4t + 5)$ m. The magnitude of velocity of the particle at $t = 2$ s will be : (15 Apr 2023 | Shift 1)
- (A) 14 ms^{-1} (B) 16 ms^{-1}
(C) 10 ms^{-1} (D) 06 ms^{-1}
-

6. The distance travelled by an object in time t is given by $s = (2.5)t^2$. The instantaneous speed of the object at $t = 5$ s will be: (13 Apr 2023 | Shift 2)
- (A) 5 ms^{-1} (B) 12.5 ms^{-1}
(C) 62.5 ms^{-1} (D) 25 ms^{-1}
-

7. A person travels x distance with velocity v_1 and then x distance with velocity v_2 in the same direction. The average velocity of the person is v , then the relation between v , v_1 and v_2 will be. (10 Apr 2023 | Shift 2)
- (A) $V = V_1 + V_2$ (B) $V = \frac{v_1 + v_2}{2}$
(C) $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$ (D) $\frac{2}{V} = \frac{1}{v_1} + \frac{1}{v_2}$
-

8. An object moves with speed v_1 , v_2 and v_3 along a line segment AB, BC and CD respectively as shown in figure. Where $AB = BC$ and $AD = 3AB$, then average speed of the object will be:



- (1 Feb 2023 | Shift 1)
- (A) $\frac{v_1 v_2 v_3}{3(v_1 v_2 + v_2 v_3 + v_3 v_1)}$ (B) $\frac{(v_1 + v_2 + v_3)}{3}$
(C) $\frac{(v_1 + v_2 + v_3)}{3v_1 v_2 v_3}$ (D) $\frac{3v_1 v_2 v_3}{(v_1 v_2 + v_2 v_3 + v_3 v_1)}$
-

9. A horse rider covers half the distance with 5 m/s speed. The remaining part of the distance was travelled with speed 10 m/s for half the time and with speed 15 m/s for other half of the time. The mean speed of the rider averaged over the whole time of motion is $\frac{x}{7} \text{ m/s}$. The value of x is _____. (30 Jan 2023 | Shift 1)

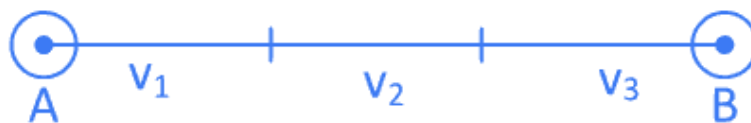
10. A vehicle travels 4 km with speed of 3 km/h and another 4 km with speed of 5 km/h, then its average speed is (30 Jan 2023 | Shift 2)
- (A) 3.75 km/h (B) 4.25 km/h
(C) 3.50 km/h (D) 4.00 km/h
-

11. A car travels a distance of 'x' with speed v_1 and then same distance 'x' with speed v_2 in the same direction. The average speed of the car is : (25 Jan 2023 | Shift 1)
- (A) $\frac{v_1 v_2}{2(v_1 + v_2)}$ (B) $\frac{2v_1 v_2}{v_1 + v_2}$
(C) $\frac{2x}{v_1 + v_2}$ (D) $\frac{v_1 + v_2}{2}$
-

12. The distance travelled by a particle is related to time t as $x = 4t^2$. The velocity of the particle at $t = 5s$ is :- (25 Jan 2023 | Shift 2)
- (A) 25 ms^{-1} (B) 20 ms^{-1}
(C) 8 ms^{-1} (D) 40 ms^{-1}
-

13. If $t = \sqrt{x} + 4$, then $\left(\frac{dx}{dt}\right)_{t=4}$ is : (29 Jul 2022 | Shift 1)
- (A) 4 (B) zero
(C) 8 (D) 16
-

14. A car covers AB distance with first one-third at velocity $v_1 \text{ ms}^{-1}$, second one-third at $v_2 \text{ ms}^{-1}$ and last one-third at $v_3 \text{ ms}^{-1}$. If $v_3 = 3v_1$, $v_2 = 2v_1$ and $v_1 = 11 \text{ ms}^{-1}$ then the average velocity of the car is _____ ms^{-1} .



(28 Jun 2022 | Shift 2)

15. The instantaneous velocity of a particle moving in a straight line is given as $V = \alpha t + \beta t^2$, where α and β are constants. The distance travelled by the particle between 1s and 2s is : (25 Jul 2021 | Shift 2)
- (A) $3\alpha + 7\beta$ (B) $\frac{3}{2}\alpha + \frac{7}{3}\beta$
(C) $\frac{\alpha}{2} + \frac{\beta}{3}$ (D) $\frac{3}{2}\alpha + \frac{7}{2}\beta$
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